

Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II

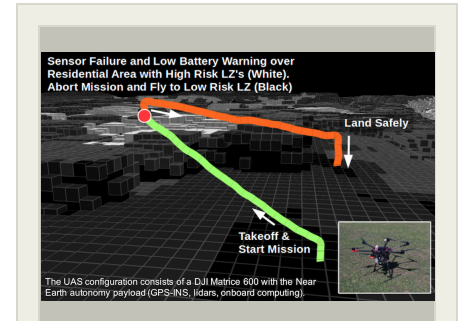
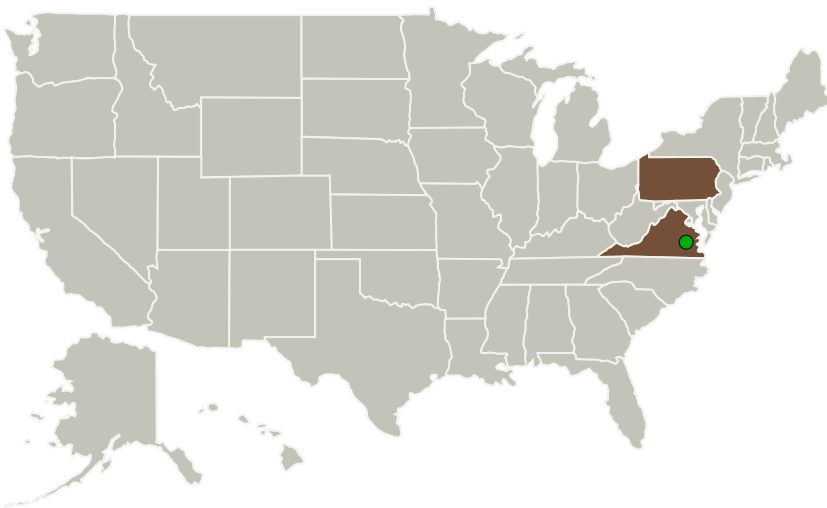
Completed Technology Project (2017 - 2020)



Project Introduction

Unmanned Aircraft Systems (UAS) operating in the national airspace system (NAS) have the potential to significantly impact modern society. It is now common to consider UAS for difficult and dangerous tasks such as fire fighting and dull tasks such as surveying crops. In addition, the autonomous elements from such UAS are being considered as a means to provide safe personal aviation. Open questions remain, however, about how unmanned autonomous aircraft can be safely incorporated into the NAS. UAS operating in the NAS must (1) sense and avoid other vehicles and follow air traffic commands, (2) avoid the terrain and land safely without operator intervention, (3) react to contingencies such as engine-out and lost-link scenarios, and (4) be reliable (by FAA airworthiness standards) and cost-effective. The current approach for UAS integration relies on radio links and the operator's acuity to direct them safely. Lost links, however, are unavoidable. UAS must have the capability to make their own decisions based on information available via databases and any information discovered by onboard sensors. This is especially the case for rare events such as the failure of propulsion or safety sensing. Near Earth Autonomy proposes to develop technologies and capabilities leading to fully autonomous systems that are able to discover and safely adapt to rare events in their environment with minimal or no human involvement. This proposal focuses on developing an Autonomous Contingency System in the form of sensors and computer software that will enable UAS of the future to be operable safely in the NAS. Additionally, the proposal addresses how the technical challenges can be met and how the technology developed can be shown to be both trustworthy and commercially viable for general aviation.

Primary U.S. Work Locations and Key Partners



Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Near Earth Autonomy, Inc.	Lead Organization	Industry	Pittsburgh, Pennsylvania
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Pennsylvania	Virginia

Project Transitions

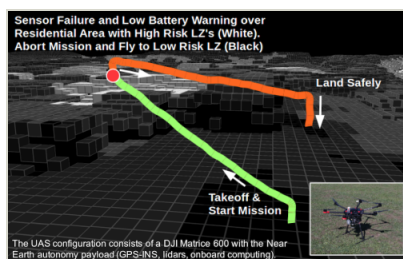
May 2017: Project Start

March 2020: Closed out

Closeout Documentation:

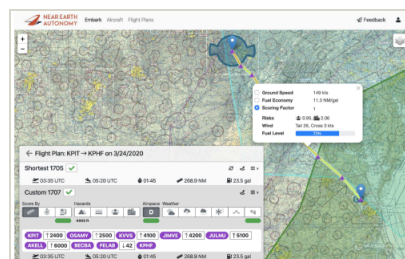
- Final Summary Chart(<https://techport.nasa.gov/file/140886>)

Images



Briefing Chart Image

Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II Briefing Chart Image
(<https://techport.nasa.gov/image/127307>)



Final Summary Chart Image

Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II
(<https://techport.nasa.gov/image/132658>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Near Earth Autonomy, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

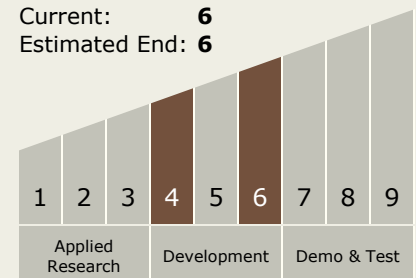
Carlos Torrez

Principal Investigator:

Kyle Strabala

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



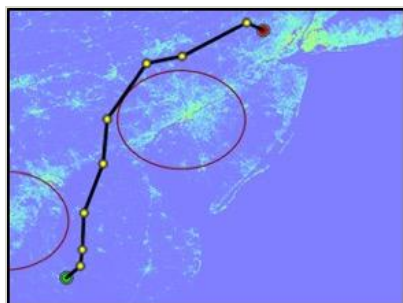
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Final Summary Chart Image

Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II
(<https://techport.nasa.gov/image/127026>)



Final Summary Chart Image

Autonomous Contingency Detection and Reaction for Unmanned Aircraft, Phase II
(<https://techport.nasa.gov/image/126015>)

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.4 Architectures and Infrastructure

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System